

A New and Threatened Arborescent *Miconia* (Melastomataceae: Miconieae) from the Osa Peninsula, Costa Rica

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Miconia osaensis, a distinctive new arborescent species is described from the Osa Peninsula of Costa Rica. It is distinguished by its flattened, two-edged uppermost branchlets, dense stellulate-lepidote vegetative indument, 5-plinerved leaf blades, calyptrate calyx that falls away as a unit, inappendiculate anthers, 5-locular ovary, and pyramidal seeds with a smooth testa. Among described congeners it is superficially similar to *M. centrosperma* Almeda of Panama which also has two-edged young branchlets, a similar indument, inappendiculate anthers, and a 5-locular ovary but differs in having 3-plinerved leaf blades, a calyx that ruptures at anthesis into irregular persistent lobes, and seeds that are angularly ridged with a conspicuous spur on the distal truncate surface. Seven individuals of this new species are known from two localities on the Osa Peninsula. The few known individuals and their apparent restriction to the Osa Peninsula outside of the Corcovado National Park suggests that this species is threatened. The species is illustrated with diagnostic line drawings and photographs of living plants.

Resumen

Miconia osaensis, una nueva especie arbórea bastante distintiva se describe de la Península de Osa en Costa Rica. Se distingue por sus ramitas superiores anguladas y aplanadas, indumento en partes vegetativas estrellado-lepidoto, láminas foliares 5-plinervadas, cáliz caliptrado que se cae como una unidad, anteras inapendiculadas, ovario 5-locular, y semillas piramidales con la testa lisa. Entre los congéneres descritos, es superficialmente similar a *M. centrosperma* Almeda de Panamá, la cual también tiene ramitas anguladas, indumento similar, anteras inapendiculadas, y el ovario 5 locular, pero difiere en sus láminas foliares 3-plinervadas, el cáliz que se rompe en la antesis en lóbulos persistentes irregulares, y semillas que tienen ranuras anguladas y un espolón conspicuo en la superficie distal truncada. Siete individuos de esta nueva especie se conocen de dos localidades de la Península de Osa. La poca cantidad de individuos conocidos unido a su aparente restricción en la península, afuera del parque Nacional Corcovado, sugieren que esta especie se encuentra amenazada. La especie se ilustra con un dibujo diagnóstico y fotografías de plantas vivas.

The Osa Peninsula, one of two major peninsulas on Costa Rica's Pacific coast, is one of the richest areas for plant diversity in the Mesoamerican region. At least 2571 species of seed plants and 289 species of ferns and fern allies are presently recorded from the area (Zamora et al. 2004).

Botanical exploration of the peninsula during the past two decades for the Manual de la Flora de Costa Rica has resulted in the addition of at least 116 species of vascular plants new to Costa Rica, including 57 new to science (52 of which are considered endemic). One third (Rosero-Bixby et al. 2002) to one fourth (Weber et al. 2002) of the tree species known from Costa Rica are believed to occur on the Osa Peninsula, including half of the species accorded threatened status (Rosero-Bixby 2002). Based on experimental plots, the diversity of tree species on the Peninsula and adjacent areas has been estimated to be around 112 to 201 per hectare (Huber 1996; Weissenhofer 1996; Zamora et al. 2004). A total of about 700 tree species are now known to occur on the Peninsula, making it the most diverse region in all of Central America (Allen 1956; Quesada et al. 1997; Weber et al. 2001). In this paper we add to this diversity by describing *Miconia osaensis*, which is presently known only from the Osa Peninsula.

Close to 90 species (in 18 genera) of Melastomataceae have been reported from the Osa Peninsula (Weber et al. 2001). This figure represents around 35% of the melastomes known to occur in Costa Rica. Not surprisingly, the most diverse genus of the family on the Peninsula is *Miconia* with 35 species. *Miconia* is one of the largest and most diverse genera of woody plants in the neotropics with close to 1100 species. There are four species of Melastomataceae endemic to the Osa Peninsula and the Golfo Dulce region: *Miconia dissitiflora* Almeda, *Miconia osaensis* (here described), *Mouriri osaensis* Morley, and *M. tuberculata* Morley & K. Thomsen.

The new species described here was first collected in sterile condition in 1996. It was discovered during a project designed to gain an understanding of woody plant diversity on the Peninsula with the establishment of four experimental study plots of one hectare each in Los Mogos (33 km from Chacarita on the Osa Peninsula) by R. Aguilar and N. Zamora. This study site, which has 201 woody species with dbh > 2 cm, is the most diverse sampled on the Peninsula to date. Seven of the 201 recorded species were melastomes; five *Miconias* (*M. affinis*, *M. ampla*, *M. multispicata*, *M. osaensis* and *M. trinervia*), *Henriettea tuberculosa* and *Mouriri myrtifolia*. This site and the few others where *M. osaensis* have been recorded are outside of Corcovado National Park, the best protected area in the region for rare, rainforest tree species. This coupled with the fact that only seven individuals of this new tree were found among the 1161 individuals present in only one of the one hectare plots suggest that this species is local and threatened.

***Miconia osaensis* Aguilar, Kriebel, and Almeda, sp. nov.**

TYPE: COSTA RICA: **Puntarenas:** Cantón de Osa, Reserva Forestal Golfo Dulce, entrada a Chocuaco, por la casa de Moncho, 8°43'00"N, 83°34'50"W, 200–350 m, 28 May 1997, R. Aguilar 5145 (Holotype: INB; isotypes: CAS, CR, MO, USJ)

Frutex vel arbuscula 15–20 m altus. Ramuli obscure quadrangulati sicut petioli folia subtus inflorescentia dense lepidoti induti. Petioli 1.5–4.5 cm longi; lamina 7.5–21 x 3–7 cm elliptica a elliptico oblonga, 5-plinervata. Panicula 11–13 cm longa multiflora; flores 5-meri, pedicellis (ad anthesim) 0.25–0.5 mm longis, bracteoli 1–1.5 mm longis triangularis. Hypanthium (ad torum) 3 mm longum; calyx primum in cono apiculato clausus demum in lobos irregulares persistentes ruptus, dentibus exterioribus 0.15–0.25 mm eminentibus. Petala 5–7 x 2.5–4 mm oblonga glabra. Stamina isomorphica glabra; filamenta 2.5 mm longa; antherum thecae 2 x 0.4 mm oblongae glabrae luteae et complanatae, poro ventraliter inclinato; connectivum nec prolongatum nec appendiculatum. Stylus 4–5 mm glaber; ovarium 5-loculare et inferum glabrum. Semina pyramidata laevigata.

Tree 9–25 m tall and ca. 6–37 dbh; the uppermost flattened and two sided branchlets, vegetative buds, petioles, veins on the abaxial leaf-surface, inflorescence rachis, bracts and bracteoles

completely covered with a stellulate-lepidote indument. Leaves of a pair equal to subequal in size; petioles 1.5–4.5 cm long; leaf-blades ca. 7.5–21 cm long and 3–7 cm wide, chartaceous, elliptic to elliptic-oblong or slightly elliptic-lanceolate, the margin entire to inconspicuously crenulate-denticulate, the apex acute to acuminate, the base acute, 5-plinerved, with the inner pair of primary veins originating ca. 0.5–1.5 cm above the blade base and diverging from the midvein in alternate or subalternate fashion, or arising from a common point, the adaxial surface glabrous, the abaxial surface completely covered by peltate scales. Inflorescence a terminal multiflowered panicle 11–13 cm long; bracts and bracteoles triangular, 1–1.5 x 0.25–0.5 mm, apparently persistent; flowers subsessile, with pedicels 0.25–0.5 mm. Hypanthium (at anthesis) campanulate, ca. 3 mm long to the torus, densely covered with peltate scales that grade into stellate hairs; calyx tube 1–1.5 mm long; calyx calyptriform, falling away as a unit, the calyptra apiculate, white when fresh, drying somewhat hyaline and papery; calyx teeth reduced to minute tubercles. Petals 5, ca. 5–7 x 2.5–4 mm, glabrous, white, oblong but wider distally, emarginate at the apex. Stamens 10, isomorphic; filaments glabrous, 2.5 mm long; anthers 2 x 0.4 mm, yellow, oblong, laterally compressed, 2-celled, the single pore slightly ventrally inclined; connective simple, thickened dorsally but neither prolonged nor appendaged. Ovary 5-locular, completely inferior, globose, the apex somewhat depressed and ridged, glabrous. Style ca. 4–5 mm long, erect, glabrous, straight but curved towards the apex; stigma punctiform. Berry globose, purple-black when mature, 6 mm in diameter; seeds 0.5 mm long, broadly pyramidal, rounded to bluntly angled on the convex face, the testa smooth. Figs. 1 and 2.

HABITAT AND DISTRIBUTION.—*Miconia osaensis* is known only from the Reserva Forestal Golfo Dulce on the Osa Peninsula of Costa Rica's south Pacific coast where it was found growing in tropical rain forests from about 100 to 350 meters in elevation (Fig. 3). This species has not been recorded inside the largest and best protected area on the peninsula, Corcovado National Park. *Miconia osaensis* grows sympatrically with the following species that are endemic to the peninsula and adjacent areas: *Acacia allenii* D.H. Janzen, *Coccoloba standleyana* P.H. Allen, *Costus stenophyllus* Standl. & L.O. Williams, *Dalechampia osana* Armbr., *Dichapetalum hammelii* Prance, *Drymonia uninerva* Wiehler and *Huberodendron allenii* Standl. & L.O. Williams.

PARATYPES.—COSTA RICA: **Puntarenas:** Cantón de Osa, Reserva Forestal Golfo Dulce, Mogos Bahía Chal (entrada a Chocuaco a 35 km. de Chacarita) Finca de Carlos Rojas (entre los repastos, charrales y parches de bosque intervenido), 8°44'10"N, 83°28'00"W, 100 m, *R. Aguilar* 6208 (CAS, CR, INB, MO, USJ); Cantón de Osa, Reserva Forestal Golfo Dulce, Los Charcos de Osa, sendero Dendrobates, 8°40'18"N, 83°30'17"W, 49 m, 3 Jun. 2006, *R. Aguilar* 10228 (BM, CAS, COL, CR, F, INB, K, MEXU, MO, NY, PMA", *loc. cit.*, 29 Mar. 2006, *R. Aguilar* & *D. Santamaría* 10200 (BM, CAS, COL, CR, F, INB, K, MEXU, MO, NY, PMA, QCNE, USJ).

DISCUSSION.—*Miconia osaensis* is one of several species of *Miconia* that are frequently confused because of the dense indument covering the abaxial foliar surface. This superficial similarity makes their definitive identification sometimes uncertain if fertile material is lacking. For this reason, the first sterile specimens of *M. osaensis* discovered were tentatively identified as *M. punctata* (Desr.) D. Don ex DC.

The calyptrate calyx of *Miconia osaensis* is reminiscent of the circumsicssle calyptrate calyx that is typical of the genus *Conostegia* but differs in its papery consistency. The simple inappending laterally compressed anther thecae of *M. osaensis* are also similar to those of *Conostegia*. Pleiostemony, another character that is typically helpful in separating *Conostegia* from *Miconia* is lacking in *M. osaensis*. It is probable that the similarities between this new taxon and species of *Conostegia* are the product of morphological convergence. A calyptrate or rupturing calyx appears to have evolved in some species of several currently recognized genera of Miconiaceae. Inclusion of

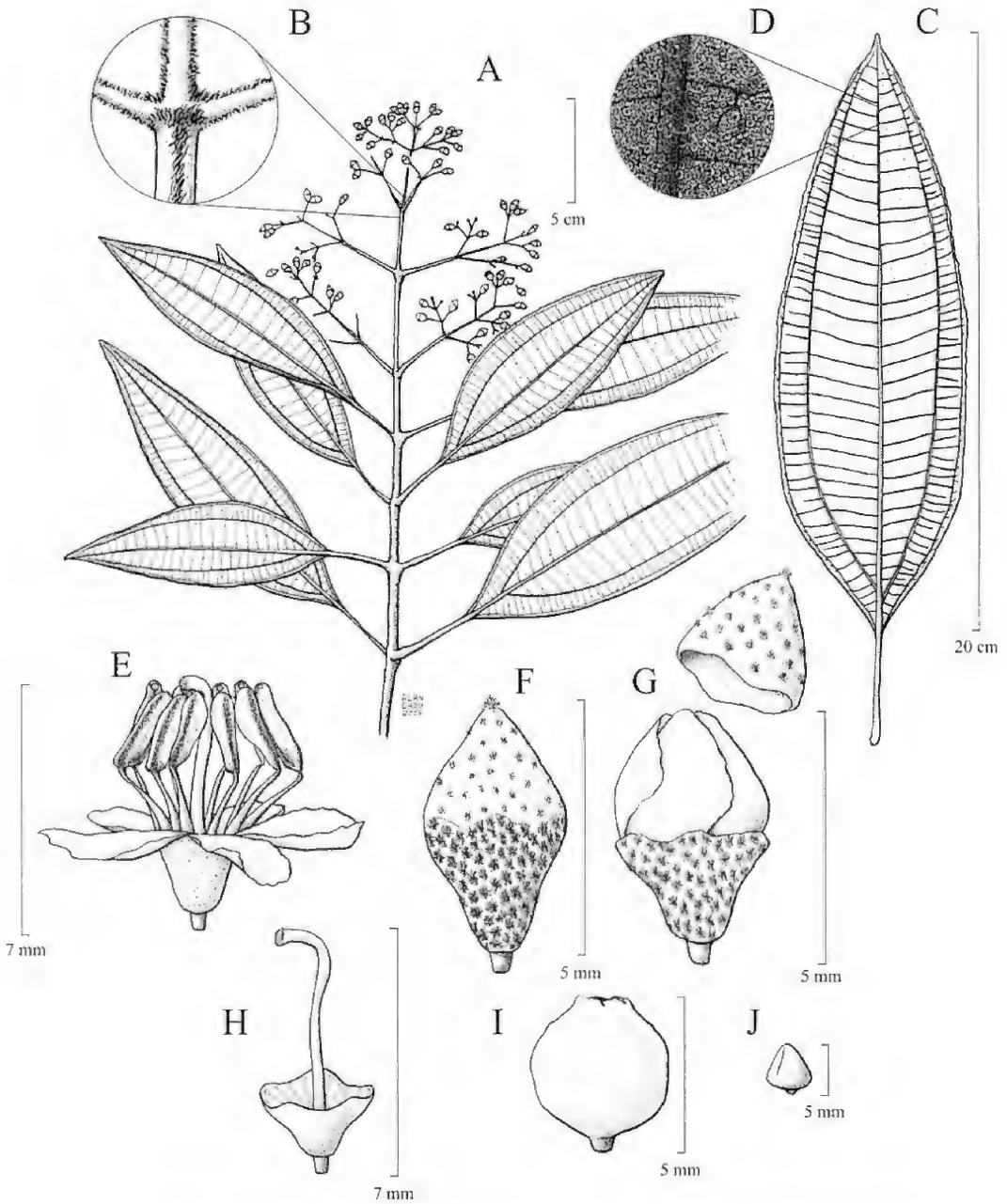


FIGURE 1. *Miconia osaensis*. A. Habit of flowering branch. B. Detail of the inflorescence rachis indument. C. Abaxial view of leaf. D. Detail of the abaxial foliar surface indument. E. Flower. F. Floral bud. G. Floral bud with dehiscent calyptra. H. Old flower without petals and stamens showing style. I. Maturing fruit. J. Seed. From *R. Aguilar 5145* (Holotype: INB; isotypes: CAS, CR, MO, USJ).

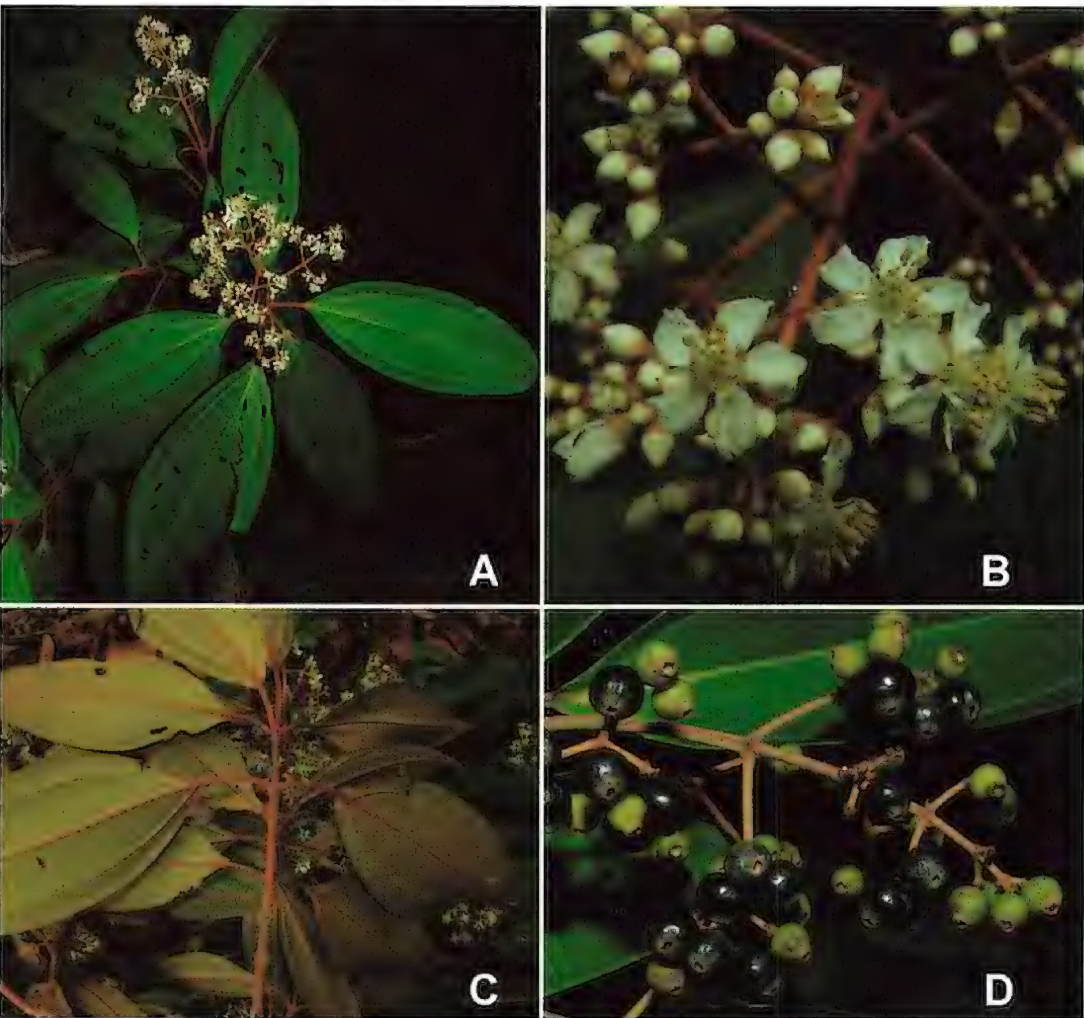


FIGURE 2. *Miconia osaensis*. A. Flowering branch. B. Inflorescence. C. Branch showing leaf abaxial foliar surfaces. D. Fruit.

M. osaensis into ongoing molecular phylogenetic studies of the tribe Miconieae (Michelangeli et al. 2004) will eventually help elucidate the best placement of this species and the evolutionary significance of the calyptrate calyx.

Among species of *Miconia*, *M. osaensis* most resembles *M. centrosperma* Almeda, and a probable new species (known from incomplete material) that is very close to *M. centrosperma* (Almeda, 1983). These taxa share a similar indument, a fused calyx, isomorphic stamens, yellow laterally compressed anthers with simple connectives and a five locular ovary. *Miconia osaensis* differs from *M. centrosperma* in its large inflorescences that measure from about 11 to 13 cm long, fused calyx that falls away as a unit and berries that are up to 6 mm in diameter (*M. centrosperma*: inflorescence 2–2.5 cm, fused calyx rupturing irregularly and not falling as a calyptra and berries about 3–4 mm in diameter). The seed of *M. centrosperma* also differs markedly from *M. osaensis* in being cuneate-angular with minute papillae on the angles and a conspicuous spur on the wider truncate end. Another striking difference is the presence of a setose rim surrounding the crateriform cavity

left by the style on the ovary apex in *M. centrosperma* but absent in *M. osaensis*.

When Almeda (1983) described *Miconia centrosperma*, he compared it to *M. fulvostellata* L.O. Williams and *M. oligocephala* Donn. Sm. citing similarities in vegetative aspect, staminal features and seed shape. Both of these species differ from *M. centrosperma* (as described by Almeda 1983) and *Miconia osaensis* by their well-defined non-rupturing calyx lobes, capitate to subcapitate stigmas and copious stellate pubescence. *Miconia osaensis* is provisionally assigned to *Miconia* section *Amblyarrehna* as was *M. centrosperma* (Almeda, 1983).

In the recent publication of the Melastomataceae in the Manual de Plantas de Costa Rica (Almeda et al. 2007), *Miconia osaensis* keys out to Key V of the master key because its abaxial foliar surface is essentially invisible because of the dense indument. Within Key V, *M. osaensis* would key out to couplet 5 because of its petiolate, 5-plinerved leaves, truncate to undulate calyx, yellow anthers, and 5-locular ovary. Couplet 5 differentiates *Miconia dissitinervia* Kriebel, Almeda & A. Estrada and *Miconia incurva* Gleason. From both of these species *M. osaensis* differs in its stellate-lepidote indument, lack of calyx teeth, calyptrate calyx, and smooth seeds (vs. stellate-tomentose indument in *M. dissitinervia* and stellate-ferrugineous in *M. incurva*, presence of calyx teeth in both of the latter, calyx closed in bud but rupturing irregularly in *M. dissitinervia* and regularly in *M. incurva*, and muricate to papillate seeds in *M. dissitinervia* and muriculate in *M. incurva*).

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LITERATURE CITED

- ALLEN, P. 1956. *The Rain Forests of Golfo Dulce*. University of Florida Press, Gainesville, Florida, USA. 417 pp.
- ALMEDA, F. 1983. Three new Mesoamerican species of *Miconia* (Melastomataceae). *Brittonia* 35(1):42–48.
- ALMEDA, F., R. KRIEBEL, AND G. UMAÑA. 2007. Melastomataceae. Pages 394–574 in B.E. Hammel, M.H. Grayum, C. Herrera, and N. Zamora, eds., *Manual de plantas de Costa Rica. Vol. 6. Dicotiledóneas (Haloragaceae–Piperaceae)*. Monographs in Systematic Botany from the Missouri Botanical Garden, vol. 111.
- HUBER, W. 1996. *Floristische und biogeographische Untersuchungen in einem Tieflandregenwald in der pazifischen Region von Costa Rica*. Diplomarbeit, Universität Wien, Austria.
- MICHELANGELI, F.A., D.S. PENNEYS, J. GIZA, D. SOLTIS, M.H. HILS, AND J.D. SKEAN, JR. 2004. A preliminary phylogeny of the tribe *Miconieae* (Melastomataceae) based on nrITS sequence data and its implications on inflorescence position. *Taxon* 53(2):279–290.
- QUESADA Q., F.J., Q. JIMÉNEZ M., N. ZAMORA V., R. AGUILAR F., AND J. GONZÁLEZ R. 1997. *Árboles de la*

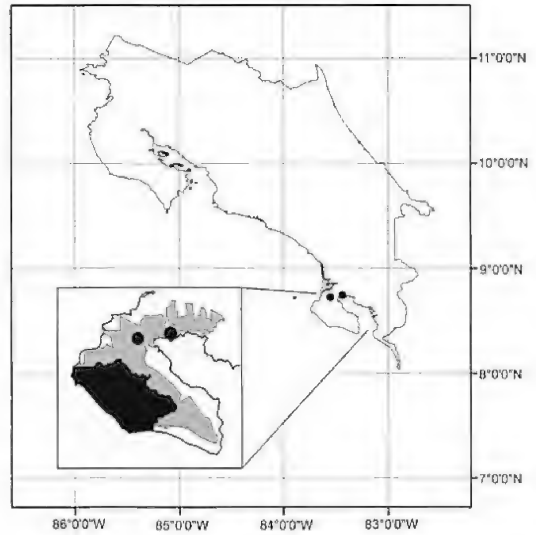


FIGURE 3. Distribution of *Miconia osaensis* in the Osa Peninsula. In the enlarged detail of the Peninsula the blackened area is Corcovado National Park and the shaded is the Golfo Dulce Forest Reserve.

- Península de Osa*. Editorial del Instituto Nacional de Biodiversidad, Heredia, Costa Rica. 411 pp.
- ROSETO-BIXBY, L., T. MALDONADO-ULLOA, AND R. BONILLA-CARRIÓN. 2002. Bosque y población en la Península de Osa, Costa Rica. *Revista de Biología Tropical* 50(2):585–598.
- WEBER, A., W. HUBER, A. WEISSENHOFER, N. ZAMORA, AND G. ZIMMERMANN, EDS. 2001. An introductory field guide to the flowering plants of the Golfo Dulce rain forests, Costa Rica. *Stapfia* 78:1–465+.
- WEISSENHOFER, A. 1996. *Ökologie und Struktur eines Tieflandregenwaldes in der Pazifikregion von Costa Rica*. Diplomarbeit, Universität Wien, Austria.
- ZAMORA, N., B.E. HAMMEL, AND M.H. GRAYUM. 2004. Vegetación/ Vegetation. Pages 91–216 in B.E. Hammel, M.H. Grayum, C. Herrera, and N. Zamora, eds., *Manual de Plantas de Costa Rica. Vol. I. Introducción/ Introduction*. Monographs in Systematic Botany from the Missouri Botanical Garden, Vol. 97.